

Mathematics Examples Depth-of-Knowledge Levels

Sample Mathematics Assessment Items

Now try coding some sample assessment items using the Mathematics DOK Levels. The following are sample items for three different grade levels. After you are finished coding these, read our “Answers” on the page that follows.

Grade 4

1)

The class went on a field trip. The students left school at 9:00 a.m. They returned to school at 1:30 p.m. How long were they gone?

- A 8 hr 30 min
- B 8 hr
- C 4 hr 30 min
- D 4 hr

- 2) Sam, Tetsuo, and Kim each own some baseball cards that Ted is willing to trade them for. Here is what they are worth:

| <u>Sam's cards:</u> | | <u>Tetsuo's cards:</u> | | <u>Kim's cards:</u> | |
|---------------------|--------|------------------------|--------|---------------------|--------|
| | | | | | |
| Bret Boone | \$0.80 | Sammy Sosa | \$1.30 | Randy Johnson | \$0.70 |
| Andres Galarraga | \$0.40 | Greg Maddux | \$1.00 | Barry Bonds | \$2.30 |
| Mark McGuire | \$1.50 | | | | |

Ted will trade his Alex Rodriguez card for \$6.75 worth of cards. What is the best trade that Sam, Tetsuo, and Kim can make for Ted's Alex Rodriguez card?

What trade could Sam, Tetsuo, and Kim offer Ted that would be the most fair between Sam, Tetsuo, and Kim?

Explain your thinking and show all your work.

3)

Bill lives on the side of the street with even-numbered addresses. Which addresses below would be found on Bill's side of the street?

- A 1020, 1022, 1024
- B 2021, 2023, 2025
- C 3168, 3169, 3170
- D 4167, 4168, 4170

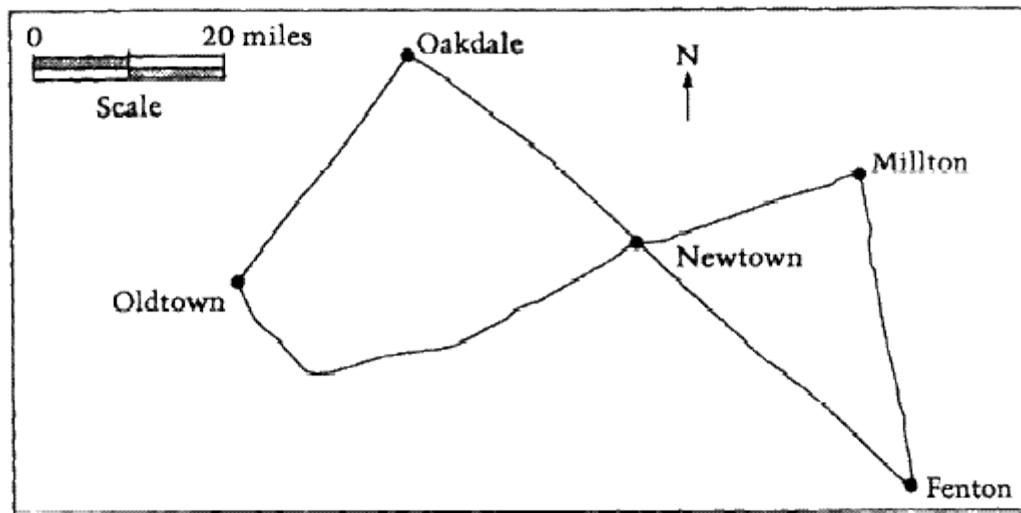
4)

Think carefully about the following question. Write a complete answer. You may use drawings, words, and numbers to explain your answer. Be sure to show all of your work.

Laura wanted to enter the number 8375 into her calculator. By mistake, she entered the number 8275. Without clearing the calculator, how could she correct her mistake?

Without clearing the calculator, how could she correct her mistake another way?

5)



Based on the map above, about how many miles is the shortest route from Oakdale to Fenton?

- A) 100
- B) 70
- C) 40
- D) 20

Grade 8

6)

From any vertex of a 4-sided polygon, 1 diagonal can be drawn.
From any vertex of a 5-sided polygon, 2 diagonals can be drawn.
From any vertex of a 6-sided polygon, 3 diagonals can be drawn.
From any vertex of a 7-sided polygon, 4 diagonals can be drawn.

How many diagonals can be drawn from any vertex of a 20-sided polygon?

7)

A triangle has 0 diagonals, a quadrilateral has 2 diagonals, a pentagon has 5 diagonals, and a hexagon has 9 diagonals. If the pattern continues, how many diagonals will an octagon have?

| | | | | |
|------------------|---|---|---|---|
| Sides | 3 | 4 | 5 | 6 |
| Diagonals | 0 | 2 | 5 | 9 |

- A** 11
- B** 14
- C** 18
- D** 20

8)

In which set are the numbers equivalent?

- A** $\frac{1}{3}$, $\frac{3}{27}$, 33%
- B** 0.090, 90%, 0.90
- C** 88%, $\frac{88}{100}$, $\frac{22}{25}$
- D** 0.66%, $\frac{2}{3}$, 66.7%

9)

The school newspaper conducted a survey about which ingredient was most preferred as a pizza topping. This graph appeared in the newspaper article.



What information would best help you determine the number of people surveyed who preferred sausage?

- A number of people surveyed and type of survey used
- B type of survey used and ages of people surveyed
- C percent values shown on chart and number of people surveyed
- D ages of people surveyed and percent values shown on chart

10)

Look at the drawing. The numbers alongside each column and row are the total of the values of the symbols within each column and row. What should replace the question mark?

| | | | | |
|---|----|----|----|----|
| | | | | 28 |
| | | | | 30 |
| | | | | 20 |
| | | | | 16 |
| ? | 19 | 20 | 30 | |

- A. 23
- B. 25
- C. 28
- D. 30
- E. 32

Grade 11

11) Which of the following is NOT true for any value of x ?

- A** $x < x^2 < x^3$
- B** $x^3 < x < x^2$
- C** $x^2 < x < x^3$
- D** $x < x^3 < x^2$
- E** $x^3 < x^2 < x$

12)

Players A and B are playing a game. On a table between them is a stack of n pennies. First, Player A removes either one or two pennies from the stack. Then Player B removes either one or two pennies from the stack. They alternate in this way until no pennies remain. The loser is the player who removes the last penny from the stack.

If they start the game with 5 pennies in the stack, how many pennies should Player A take from the stack on her first turn? Why?

If the game starts with 7 pennies in the stack, would you rather be Player A or B? Why?

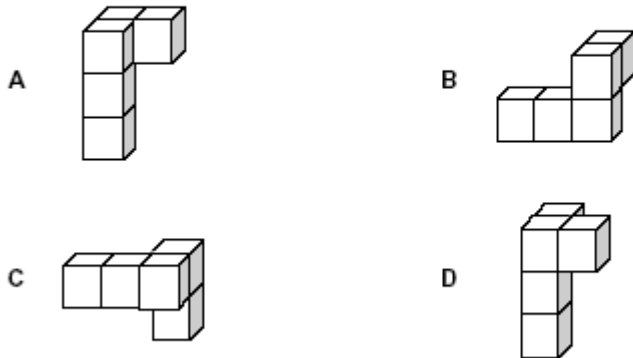
For what values of n , if any, is it best to be player A?

For what values of n , if any, is it best to be player B?

Explain and justify your answers.

13)

Which pentacube is **not** congruent to the others?



14)

One plan for a state income tax requires those persons with income of \$10,000 or less to pay no tax and those persons with income greater than \$10,000 to pay a tax of 6 percent only on the part of their income that exceeds \$10,000.

A person's effective tax rate is defined as the percent of total income that is paid in tax.

Based on this definition, could any person's effective tax rate be 5 percent? Could it be 6 percent? Explain your answer. Include examples if necessary to justify your conclusions.

15)

$$S = a/b + c/d$$

If $0 < a < b < c < d$ in the equation above, then the greatest increase in S would result from adding 1 to the value of which variable?

- (A) a
- (B) b
- (C) c
- (D) d
- (E) *There is not enough information to know for certain.*